

Applicant: Tatu Pitkänen et al.
Application No.: 10/534,842
Response to Office action mailed Oct. 6, 2006
Response filed March 6, 2007

Remarks

Claims 25–45, and 53–60 remain pending in the application. Claims 46–52 have been canceled and new claims 53–60 have been added. In the Office action dated Oct. 6, 2006, claims 25–29 and 33–52 were rejected under 35 U.S.C. 102(b) as being anticipated by Van Haag et al. (4,903,517). Claims 30–32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Van Haag et al (4,903,517) in view of C. E. Adams (2,470,086).

The courtesy extended to applicant's counsel by examiner Octavia Davis in the telephone interview on Jan. 10, 2007, is acknowledged with appreciation. Prior to the interview a copy of the paper "Energy-Efficient Motion Control of the Digital Hydraulic Joint Actuator", copyright 2005 by Matti Injama and Matti Vilenius was supplied to the examiner in explanation of the concept of a digital valve pack. During the interview differences between the configuration of the claimed digital valve pack and the plurality of valves V1 - V6 disclosed in the Van Haag et al. reference were explained. Applicant proposed amending the claims to more clearly define the valve arrangement claimed.

Applicant has amended paragraph [0011] of the specification for clarity, including the definition of "N" which is apparent from the various examples given in the specification, from paragraph [0046] for an eight valves digital valve pack "... 2^8 = number of potential different volume flows, i.e. the digital valve pack has a resolution of 256." From paragraph [0046], "digital valve pack containing 12 on/off digital valves provides a control resolution of 4096 different volume flows". From paragraph [0055], "five on/off digital valves V; V1 to V5, the control resolution of this particular digital valve pack comprising $2^5 = 32$ states" and "16 on/off valves already achieves a control resolution of $2^{16} = 65536$ different states". Paragraph [0011] has also been amended to clarify that it is "the digital valve" that is driven directly between states. This is supported by the context paragraph [0011] in the description in paragraph [0074]. It is inherent in the foregoing that the same formula applies to valves having three states, and thus paragraph [0013] is corrected by amendment to be consistent with paragraph [0011].

Claim 25 has been amended to replace the generic limitation "digital valve pack" with

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a limitation to how a plurality of valves which are digital move from one state directly to another state, and to claim how this plurality of valves operates to alter the difference value of the variable. This language regarding the digital valve pack is taken from the specification paragraphs [0013] and [0014]. This limitation regarding the plurality of digital valves and their operation distinguishes claim 25 from the admitted prior art which uses a proportional valve i.e., like a faucet which smoothly changes between flow rates.

Claim 25 distinguishes over the applied art by claiming control using a plurality of valves, this distinguishes over Van Haag et al. which discloses “discrete [individual] pressure regulating valves” (see col. 9 line 35), and as shown in FIG. 1, each valve V1– V6 of Van Haag et al. is connected to two bearing elements 7, which dose not show a plurality of valves connected to a single bearing element. Similarly, where the examiner makes reference to Col. 9, lines 29 – 38 Van Haag et al:

The lower chambers of the cylinder and piston units 14, 15 can receive a pressurized hydraulic fluid by way of pressure regulating valves V_L and V_R , **respectively**. The primary bearing elements 7 are assembled into six neighboring groups of two bearing elements each, and each such group can receive pressurized hydraulic fluid by way of a **discrete** pressure regulating valve V1, V2, V3, V4, V5, V6, respectively. Similar pressure regulating valves can be provided for pairs of neighboring secondary bearing elements 8. The eight centrally located secondary bearing elements 8 and the pressure regulating valves for all of the secondary bearing elements are omitted in FIG. 1 for the sake of simplicity and clarity.
[Emphasis added.]

it is clear that **respectively** means one valve to one cylinder and piston unit, and **discrete** in context means “separate thing”, “distinct” as opposed to identifying a type of file i.e. digital.

As cited by the examiner (See Col. 10, lines 24 – 28). “*Signals y which are transmitted via conductors 21 denote the extent to which the respective valves must be adjusted in order to ensure that the pressure of fluid in the associated actuators A will match the corresponding pressure p_{soll} .*” Clearly indicates that each singular valve is adjusted to match a corresponding pressure—this is contrary to the claimed plurality of valves which are

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turned on and off to adjust flow or pressure.

Digital valves are known (see e.g., “Digital Valve” which is of record, but not admitted as prior art but as explanation of the claimed valve arrangement), but the examiner has not shown using a digital valve (i.e., a plurality of valves connected in parallel which are either on or off) to control position or force in an apparatus which has a roll nip between a first elongated rolling device and a second elongated rolling device in a paper or a board machine.

New claims 53–56 limit claim 25 to a method where at least, 5, 8, 12, or 16 valves having only two states are operated so the difference conditions of the plurality of digital valves are selected from at least 32, 256, 2096, or 65536 possible different conditions.

Claim 26 is directed to the difference value being determined as a digital value, which digital value is supplied to control the digital valves.

Claim 27 claims digital valves with only two states, measuring the opening between two rolling devices, opening selected digital valves and decreasing the difference value at a selected rate.

Claim 28 claims a process of active damping between a first elongated rolling device and a second elongated rolling device in a paper or a board machine using digital valves, i.e. valves that move between two states: on and off.

Claim 29 claims an arrangement having a switch, the switch being connected in control signal receiving relation to the control system, the switch (which has a plurality of digital valves) connected in parallel, and having a hydraulic device connected in sum flow volume receiving relation to a hydraulic device.

New claims 57–60 limit claim 29 to an arrangement having at least, 5, 8, 12, or 16 valves having only two states, which valves in combination have at least 32, 256, 2096, or 65536 possible different conditions.

Claim 30 claims the arrangement for each valve of the plurality of digital valves having twice the flow capacity as the previous valve.

Claim 31 claims of digital output connected to the switch.

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Claim 32 claims the digital output not passing through a digital to analog converter.

Claim 33 claims the combination of a plurality of digital files in parallel with an analog i.e., proportional, valve.

Claim 34 claims a second plurality of digital valves.

Claim 35 claims a double acting hydraulic cylinder with the first plurality of digital valves attached to one side and the second plurality of digital valves attached to the other side.

Claim 37 claims the arrangement of claim 29 in a fiber web reel-up.

Claim 38 claims an arrangement for dampening vibration in the reel-up.

Claims 39 and 40 claim the arrangement of claim 29 in a coater.

Claim 41 claims the arrangement of claim 29 in a multipaper calender.

Claim 42 claims an additional plurality of digital valves used for supporting different zones of a roll mantle in a calender.

Claim 43 claims a hydraulic actuator provided at one end of a calender roll.

Claim 44 claims rolls with loading devices therewithin a range to be controlled with at least one plurality of digital valves.

Claim 45 claims the first elongated rolling device as a doctor blade, and the hydraulic device arranged to control the pressure between the doctor blade and the second elongated rolling device.

Applicant believes that no new matter has been added by this amendment.

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Applicant submits that the claims, as amended, are in condition for allowance.
Favorable action thereon is respectfully solicited.

Respectfully submitted,



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